10601609

PCT WORLD INTELLECT Int

INTERNATIONAL APPLICATION PUBLISHE

WO 9603186A1

(51) International Patent Classification 6 :
A63C 9/086, A43B 5/04

A1

(43) International Publication Date: 8 February 1996 (08.02.96)

(21) International Application Number: PCT/US95/09169

(22) International Filing Date: 20 July 1995 (20.07.95)

(30) Priority Data:

08/278,511	21 July 1994 (21.07.94)	US
08/347,262	30 November 1994 (30.11.94)	US
08/396,594	1 March 1995 (01.03.95)	US
08/406,387	17 March 1995 (17.03.95)	US

(81) Designated States: AM, AT, AT (Utility model), AU, BB, BG, BR, BY, CA, CH, CN, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), TJ, TM, TT, UA, UG, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG).

Published
With international search report.

(71) Applicant: CRUSH SNOWBOARD PRODUCTS, INC. [US/US]; 13800 Valerio Street, Van Nuys, CA 91405 (US).

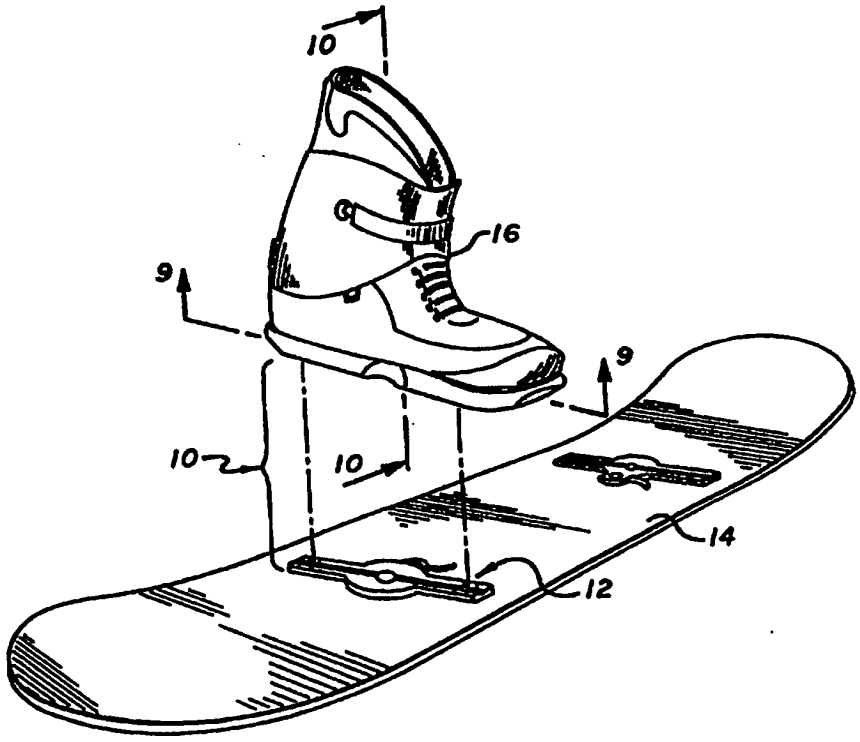
(72) Inventors: READ, Bradley, L.; 3905 Division Street, Los Angeles, CA (US). PERKINS, Richard, W.; 13800 Valerio Street, Van Nuys, CA 91405 (US).

(74) Agents: YORKS, Ben, J. et al.; Blakely, Sokoloff, Taylor & Zafman, 7th floor, 12400 Wilshire Boulevard, Los Angeles, CA 90025-1026 (US).

(54) Title: SNOWBOOT WITH ATTACHMENT PINS

(57) Abstract

A snowboot (16) for a snowboard (14) that is adjustable and can be readily attached to a releasable binding (12). Extending from the s le (20) of the boot are a pair of pins (80) which can be inserted and locked to a releasable binding (12) mounted on the board. The boot has a hard lower shell (202) that is coupled to a soft upper shell (204). The hard lower shell provides structural support for the ankles and the heel of the rider. The snowboot has a hard heel insert (162) that provides support for the heel of the snowboarder. The upper shell has a pair of web support members (206) that are arranged in a triangular configuration with the heel insert and lower shell of the boot. The triangular configuration provides structural support, and prevents the toe and heel of the snowboarder from lifting within the boot.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	**GB**	United Kingdom	**MR**	Mauritania
AU	Australia	**GE**	Georgia	**MW**	Malawi
BB	Barbados	**GN**	Guinea	**NE**	Niger
BE	Belgium	**GR**	Greece	**NL**	Netherlands
BF	Burkina Faso	**HU**	Hungary	**NO**	Norway
BG	Bulgaria	**IE**	Ireland	**NZ**	New Zealand
BJ	Benin	**IT**	Italy	**PL**	Poland
BR	Brazil	**JP**	Japan	**PT**	Portugal
BY	Belarus	**KE**	Kenya	**RO**	Romania
CA	Canada	**KG**	Kyrgystan	**RU**	Russian Federation
CF	Central African Republic	**KP**	Democratic People's Republic of Korea	**SD**	Sudan
CG	Congo			**SE**	Sweden
CH	Switzerland	**KR**	Republic of Korea	**SI**	Slovenia
CI	Côte d'Ivoire	**KZ**	Kazakhstan	**SK**	Slovakia
CM	Cameroon	**LI**	Liechtenstein	**SN**	Senegal
CN	China	**LK**	Sri Lanka	**TD**	Chad
CS	Czechoslovakia	**LU**	Luxembourg	**TG**	Togo
CZ	Czech Republic	**LV**	Latvia	**TJ**	Tajikistan
DE	Germany	**MC**	Monaco	**TT**	Trinidad and Tobago
DK	Denmark	**MD**	Republic of Moldova	**UA**	Ukraine
ES	Spain	**MG**	Madagascar	**US**	United States of America
FI	Finland	**ML**	Mali	**UZ**	Uzbekistan
FR	France	**MN**	Mongolia	**VN**	Viet Nam
GA	Gabon				

SNOWBOOT WITH ATTACHMENT PINS

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

The present invention relates to a snowboot for a snowboard.

2. DESCRIPTION OF RELATED ART

Snowboard equipment typically includes a rubber or leather boot that is strapped to a snowboard by a number of buckles and straps which are mounted to the board. The board may also have a rigid rear heel member that provides structural support for the heel of the rider. Because both feet are attached to the snowboard, snowboarders must unfasten the binding straps and remove one foot from the board to push themselves onto a chair lift. To slide down a run, the boarder must re-fasten the free boot back onto the board. The constant cycle of unfastening and re-fastening the straps is both time consuming and physically exerting. It is therefore desirable to provide a snowboard binding that allows the rider to readily mount and become detached from a snowboard. Any new boot/binding assembly must provide enough structural support in the boot to properly steer the snowboard.

Different snow and terrain conditions may warrant different foot positions on the board. For example, when racing a slalom course it is preferably to stand in a more upright position on the board. When performing aerial maneuvers it is desirable to have a more forward position. Present snowboard boots and bindings do not provide both adjustability and enough boot support to operate the board. It would therefore be desirable to provide a snowboard boot that provided adequate structural support and was adjustable to allow the rider to stand in a variety of positions.

SUMMARY OF THE INVENTION

The present invention is a snowboot for a snowboard that is adjustable and can be readily attached to a releasable binding. Extending from the sole of the boot are a pair of pins which can be inserted and locked to a releasable binding mounted on the board. The boot has a hard lower shell that is coupled to a soft upper shell. The hard lower shell provides structural support for the ankles and the heel of the rider. The snowboot has a hard heel insert that provides support for the heel of the snowboarder. The upper shell has a pair of web support members that are arranged in a triangular configuration with the heel insert and lower shell of the boot. The triangular configuration provides structural support, and prevents the toe and heel of the snowboarder from lifting within the boot.

BRIEF DESCRIPTION OF THE DRAWINGS

The objects and advantages of the present invention will become more readily apparent to those ordinarily skilled in the art after reviewing the following detailed description and accompanying drawings, wherein:

Figure 1 is a perspective view showing a snowboot and snowboard assembly of the present invention;

Figure 2 is a side view of the boot;

Figure 3 is a rear view of the boot;

Figure 4 is a front view of the boot;

Figure 5 is an enlarged view of a forward lean adjustment assembly;

Figure 6 is a cross-sectional view of the forward lean adjustment assembly taken at line 6-6 of Fig. 5;

Figure 7 is an enlarged view of an axial lean adjustment assembly;

Figure 8 is a cross-sectional view of the axial lean adjustment assembly taken at line 8-8 of Fig. 7;

Figure 9 is a bottom view of the boot;

Figure 10 is a cross-sectional view of the boot sole;

Figure 11 is a perspective view of an insert for the boot;

Figure 12 is a sectional view showing a locating pin being inserted into a binding which has a locking pin;

Figure 13 is a cross-sectional view similar to Fig. 12 showing the locking pin extending through an aperture of the locating pin;

Figure 14 is a top sectional view of the binding showing the locking pins in a locked position;

Figure 15 is a top sectional view of the binding showing the locking pins moved into a release position upon rotation of a lever;

Figure 16 is a top sectional view showing a latch released from the lever;

Figure 17 is a section view of the binding housing;

Figure 18 is a top view showing a cover plate of the binding housing rotated relative to the base plate;

Figure 19 is a side view of an alternate embodiment of the boot;

Figure 20 is a cross-sectional view of the boot;

Figure 21 is an exploded view of the boot.

Figure 22 is a side section view of an alternate embodiment of the boot;

Figure 23 is a bottom view of the boot;

Figure 24 is a side view of the boot;

Figure 25 is a side view of an alternate embodiment of a snowboot;

Figure 26 is a front view of the snowboot of Fig. 25.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings more particularly by reference numbers, Figure 1 shows a boot and binding assembly 10 of the present invention. The assembly includes a pair of bindings 12 that are attached to a snowboard 14 and a pair of boots 16 that are worn by a snowboarder. The boots 16 are releasably attached to the snowboard 14 by the bindings 12.

As shown in Figures 2-4, the boot 16 has a soft inner shell 18 attached to sole 20. The inner shell 18 is typically constructed from leather, rubber or any other soft flexible material. The inner shell 18 can be tightened by laces 22 that extend up the front face of the boot 16.

The ankle portion of the boot 16 has a hard outer shell 24 that is coupled to the inner shell 18. The shell 24 is typically constructed from a molded hard plastic material. The hard outer shell 24 provides structural support for both the ankle and the heel of the rider. The outer shell 24 has an adjustable buckle assembly 26 that tightens the boot 16 onto the rider. The buckle assembly 26 can be any type of fastener found on conventional Nordic ski boots known in the art. The outer shell 24 may further have an inner layer of foam 28 that provides a cushion against the hard material of the shell 24.

The boot 16 includes a forward lean adjustment assembly 30 and an axial lean adjustment assembly 32 that allow the rider to adjust the position of the outer shell 24. By way of example, the assemblies may be adjusted so that the rider is standing in a more upright position on the board 14. Likewise, the assemblies may be adjusted so that the rider is standing in a more forward position on the board 14. The assemblies can also be disengaged so that the rider has less support and can more readily move within the boot 16. Such an arrangement may be desirable when performing aerial maneuvers.

As shown in Figures 5 and 6, the forward lean adjustment assembly 30 includes a stem 40 that has a shank 42 which extends through an aperture 44 in the outer shell 24. The stem

40 also has a seat 46 that resides within one of four holes 47 located in a position tab 48 attached to the inner shell 18. Although a separate position tab 48 is shown and described, it is to be understood that the holes 47 can be integrated into the inner shell 18. Additionally, although four holes 47 are shown and described, it is to be understood that a different number of holes 47 may located within the boot 16.

The stem 40 has a flange 50 that captures a spring 52 and prevents the stem 40 from being pulled out of the boot 16. The spring 52 biases the seat 46 into the holes 47. Pivotally attached to the stem 40 is a release tab 54. The tab 54 has a lip 56 and a cam surface 58 that engages the outer shell 24 and pulls the seat 46 out of the hole 47 when the tab 54 is pivoted about the stem 40.

To operate the forward lean adjustment assembly, the tab 54 is first rotated with the plane of the boot 16 to rotate the seat 46 within the hole 47. The tab 46 is then pivoted about the stem 40 so that the seat 46 is pulled out of the hole 47. The outer shell 24 is moved relative to the inner shell 18 so that the seat 46 is aligned with one of the other holes 47. To lock the shell 24 in place, the tab 54 is pivoted about the stem 40 such that the spring 52 pushes the seat 46 back into the hole 47. The tab 54 is then rotated to secure the seat 46 within the new hole 47 location.

Figures 7 and 8 show the axial lean adjustment assembly 32. The axial adjustment assembly 32 includes a knob 60. The knob 60 has a threaded shank 62 that screws into one of three threaded holes 64 located in the inner shell 18. The knob 60 also has a pair of pins 66 that extend into holes 68 located in the inner shell 18. There are typically 9 holes 68 located both above and below the threaded holes 64. The holes 68 are typically arranged in three rows of three.

The assembly 32 has a spring 70 that biases the knob 60 away from the inner shell 18 when the knob 60 is unscrewed from the threaded hole 64. The knob 60 may be captured by a flange 72. The flange 72 may have a pair of detent protrusions

74 that extend into corresponding detent holes 76 in the inner shell 18, when the knob 60 is unscrewed. The detents 74 maintain the position of the knob 60 and provide the rider with a physical indication of when the pins 66 are aligned with the holes 68.

To adjust the position of the outer shell with the assembly 32, the knob 60 is unscrewed from the hole 64 such that the spring 70 pushes the pins 66 out of the holes 68. The outer shell 24 can then be moved relative to the inner shell 18. The shell 24 can be moved both vertically and rotated about the stem 62. The knob 60 is then screwed back into the threaded hole 64 wherein the pins 66 are inserted into new holes 68. If the shell 24 was rotated, the pins 66 will extend into a different row of holes 68. If the shell 24 is moved in a purely vertical manner, then the pins 66 will extend into the same row of holes 68.

As shown in Figures 9 and 10, each boot 16 has a pair of locating pins 80 that extend from a bottom surface 82 of the boot 16. The pins 80 are preferably constructed from a relatively strong steel material and are integrally formed with plates 84. The plates 84 are typically molded into the sole of the boot 16. Each pin 80 has a conical tip 86 and an aperture 88 which extends through the thickness of the pin material.

The pins 80 are located within a recess 90 of the boot 16. The recess 80 allows the snowboarder to walk on the flat portion of the boot 16. As shown in Figure 11, the boot 16 may have an insert 92 that can be pressed into the recess 90 to fill the same. The insert 92 has a pair of holes 94 that receive the pins 18. The holes 94 may each have a pair of protrusions 96 that extend into the pin apertures 88. The insert 92 is typically constructed from the same rubber or hard plastic material as the sole of the boot 16. The bottom surface of the insert 92 may have traction features that also correspond to the boot sole. The insert 92 increases the traction of the boot 16, and prevents snow from entering the recess 90 and the pin apertures 88 when the snowboarder is walking on snow.

As shown in Figures 12 and 13, the locating pins 80 can be inserted into corresponding pin holes 98 of a binding housing 100. Within each hole 98 is a locking pin 102 that extends through the entire length of the locating pin apertures 88. Inserting the locking pin 102 through the entire pin aperture 88 doubles the shear strength of the pin 102.

The conical tips 86 of the locating pins 80 engage cam surfaces 104 of the locking pins 102 to move the locking pins 102 in the direction indicated by the arrow as shown in Fig. 12. Movement of the locking pins 102 allow the locating pins 80 to be fully inserted into the holes 98, so that the locking pins 102 can move into the apertures 88 as shown in Fig. 13. The boot 16 is secured to the binding and the snowboard when the locking pins 102 extend through the pin apertures 88. The locking pins 102 are preferably constructed from a relatively strong steel material.

As shown in Figure 14, the locking pins 102 are integrally formed with an armature 106 that is located within a channel 108 of the binding housing 100. The channel 108 is constructed to allow the armature 106 and pins 102 to move between a lock position and a release position.

The armature 106 has gear teeth 110 that are coupled to corresponding gear teeth 112 of a planetary gear 114. The planetary gear 114 has a lever 116 that extends from the binding housing 100. Rotating the lever 116 rotates the planetary gear 114 and moves the locking pins 102 between the release and lock positions.

Coupled to the binding housing 100 and the planetary gear 114 is a torsion spring 118. The torsion spring 118 biases the planetary gear 114 and pins 102 into the lock position. The planetary gear 114 contains a slot 120 that receives the tip of a latch 122 when the lever 116 is rotated in a clockwise direction. The latch 122 maintains the locking pins 102 in the release position when the latch tip engages the gear slot 120. A compression spring 124 pushes the tip of the latch 122 into continuous engagement with the planetary gear 114, so that the

latch tip is pushed into the gear slot 120 when the lever 116 is rotated. The latch tip can be released from the planetary gear 114 by pushing the latch with a force sufficient to overcome the force of the spring 124.

In operation, the locking pins 102 are initially in the locking position. To fasten the boot 16 to the board 14, the snowboarder inserts the locating pins 80 into the binding holes 98. As shown in Figs. 12 and 13, insertion of the pins 80 into the holes 98 moves the locking pins 102 out to the released position and back into the lock position, wherein the pins 102 extend through the apertures 88 and secure the boot 16 to the board 14.

The snowboarder can release the boot 16 from the board 14 by rotating the lever 116. As shown in Figure 15, rotation of the lever 116, rotates the planetary gear 114 and moves the locking pins 102 out of the apertures 88 and into the release position. The latch 122 maintains the pins 102 in the release position, so that the snowboarder can remove the boot 16 from the binding without having to hold the lever 116 in the rotated position.

As shown in Figure 16, to reset the binding, the user can push the latch 122 to release the planetary gear 114, wherein the torsion spring 122 rotates the gear 114 and moves the pins 102 back to the lock position.

As shown in Figures 17 and 18, the binding housing 100 is preferably constructed from a base plate 126 and a cover plate 128. The base plate 126 is mounted to the board 14 by mounting screws 130. The plate 128 may have four sets of holes, three holes per set, that allow the plate 126 to be moved to different locations on the board 14. The base plate 126 has a threaded portion 132 that receives a tie-down bolt 134 which couples the cover plate 128 to the base plate 126. Located between the base plate 126 and the cover plate 138 is a conical spring 136 which biases the cover plate 128 away from the base plate 126. The cover 128 and base 126 plates each have meshing teeth 138 that prevent plate 128 rotation. The plate

128 is preferably constructed from aluminum. The tie-down bolt 134 and plate 128 are preferably constructed from titanium to increase the thread strength therein.

In operation, to rotate the binding 12 relative to the board 14, the user can unscrew the tie-down bolt 134 so that the spring 136 moves the teeth of the cover plate 128 out of engagement with the base plate 126. The snowboarder can then rotate the binding 12 relative to the board 14. The binding 12 is fixed in the new position by screwing the bolt 134 down into the base plate 126. Rotating the binding allows the user to move the position of his feet relative to the board 14.

Figures 19-21 show an alternate embodiment of the boot. The boot 150 may have a soft upper portion 152 that is attached to a rigid shell 154. The pins 156 extend from the rigid shell 154 into the recess 158 of a console 160 that is attached to the shell 154. The shell 154 is preferably constructed from a molded urethane that has a high back portion 162 which provides support for the heel of the boarder. The snowboot 150 may further have a soft inner liner 164 that increases the comfort of the boot. The liner 164 may have a sleeve 166 which can be pulled out of the boot and replaced with a rigid shell structure that increases the rigidity of the boot. The upper portion 156 typically has laces 168 that allow the boarder to adjust the fit of the boot 150. Additionally, the boot 150 may have the insert 92 shown in Fig. 11, to cover the pins 156.

Figures 22-24 show another alternate embodiment of the boot 170. The boot 170 may have a rigid upper portion 172 attached to a soft shell 174. The boot 170 may also have a forward lean adjustment assembly 176 that allows the rigid upper portion 172 to be adjusted relative to the shell 174. The forward lean adjustment assembly 176 can be constructed and function in the same manner as the assembly shown in Figs. 2, 5 and 6. The upper portion 172 may have an accordion joint 178 that provides flexibility in the heel of the boot. Both the upper portion 172 and the shell 174 may be secured by laces 180.

The soft shell 174 may contain a reinforcing member 182. The reinforcing member 182 provides support when the snowboarder is in a wedge maneuver. The boot 170 may also contain web member 184 which supports the ankle of the snowboarder. The web member 184 can be constructed from a nylon material. The boot 170 may also contain a waterproof skirt 186 that prevents water from flowing into the foot area of the boot 170.

The bottom of the boot 170 has pins 188 located within a cavity 190. The cavity 190 has a plurality of channels 192. The channels 192 allow snow captured within the heel and toe portions of the cavity to flow out of the boot 170. The cavity 190 may have a notch 194 that allows the user to more readily remove the insert (see Fig. 11) that covers the pins 188.

Figures 25 and 26 show an alternate embodiment of a snowboot 200. The snowboot 200 has a pin (not shown) that cooperates with the binding to fasten the boot to the snowboard. The bottom of the boot 200 may have the channel features shown in Fig. 23. The pin is mounted to a rigid lower shell 202. The lower shell 202 may be constructed from a hard rubber material and have the sole of the boot formed therein. The lower shell 202 may have the heel inserts 162 and 166 shown in Fig. 20, to provide support for the heel of the snowboarder.

Attached to the lower shell 202 is an upper shell 204. The upper shell 204 is preferably constructed from a soft material such as nylon or leather. Extending from the lower shell 202 to the heel portion of the upper shell 204 is a web support member 206. There is typically a web member 206 on each side of the boot 200. The web members 206, heel insert and lower shell are arranged in a triangular configuration. The triangular configuration increases the structural support of the boot 200. Additionally, the triangular configuration prevents the toe and heel of the snowboarder from moving within the boot.

The boot 200 may have a first hold down strap 208 and a second hold down strap 210 that secure the foot to the boot 200. The straps 208 and 210 may be adjustable and have

fastening means (not shown) such as hook and loop material to secure the boot in place. The boot may be tightened with laces 212 which extend through eyes 214 located within rib members 216 of the upper shell 204. The rib members 216 are typically constructed from a soft material such as nylon.

While certain exemplary embodiments have been described and shown in the accompanying drawings, it is to be understood that such embodiments are merely illustrative of and not restrictive on the broad invention, and that this invention not be limited to the specific constructions and arrangements shown and described, since various other modifications may occur to those ordinarily skilled in the art.

What is claimed is:

1. A snowboot that is releasably attached to a binding of a snowboard, comprising:

a soft upper shell that has a heel portion;

a rigid lower shell that is attached to said upper shell, said upper shell has a sole and a heel insert that extends into said heel portion of said upper shell;

a web support member which extends from said lower shell to said heel portion of said upper shell, said web support member being arranged in a triangular configuration with said sole and said heel insert; and,

an attachment member mounted to said lower shell, said attachment member cooperates with the binding to attach said lower shell to the snowboard.

2. The snowboot as recited in claim 1, wherein said lower shell is constructed from a rubber material.

3. The snowboot as recited in claim 1, wherein said upper shell is constructed from a nylon material.

4. The snowboot as recited in claim 1, further comprising a first hold down strap that extends across a front portion of said upper shell.

5. The snowboot as recited in claim 4, further comprising a second hold down strap that extends across an ankle portion of said upper shell.

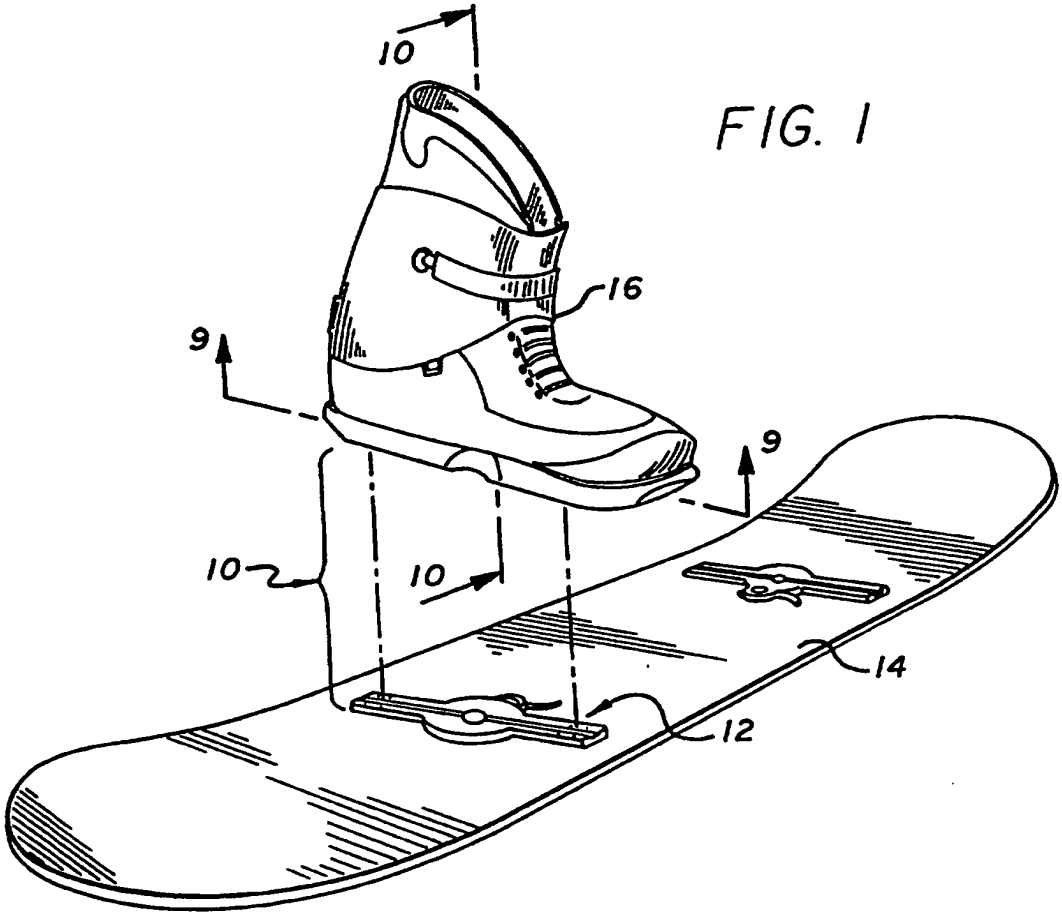


FIG. 1

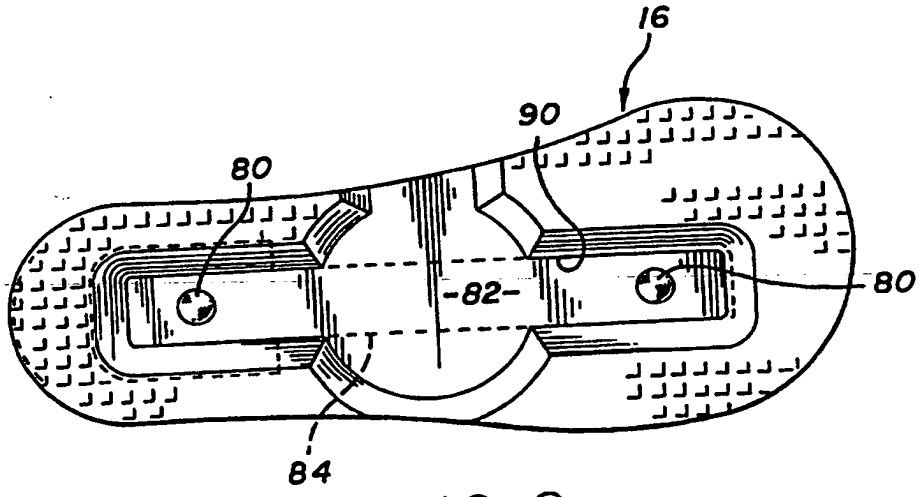


FIG. 9

FIG. 2

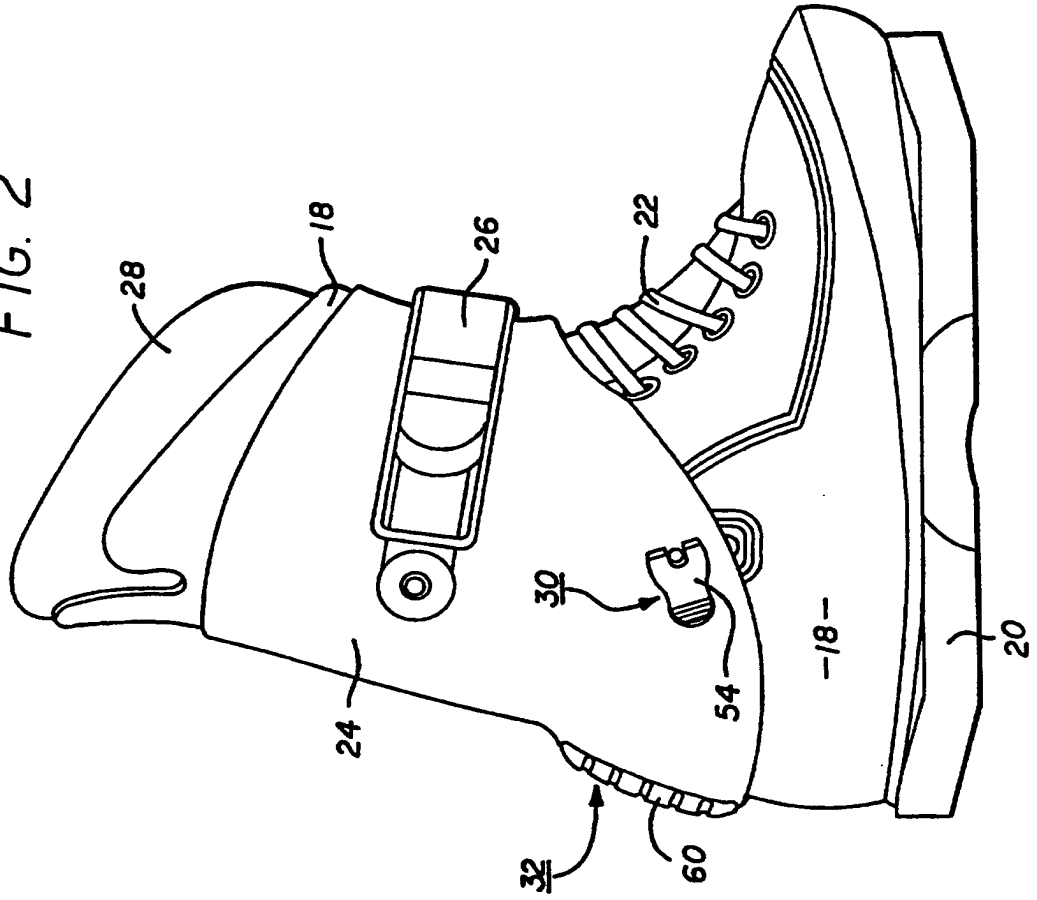
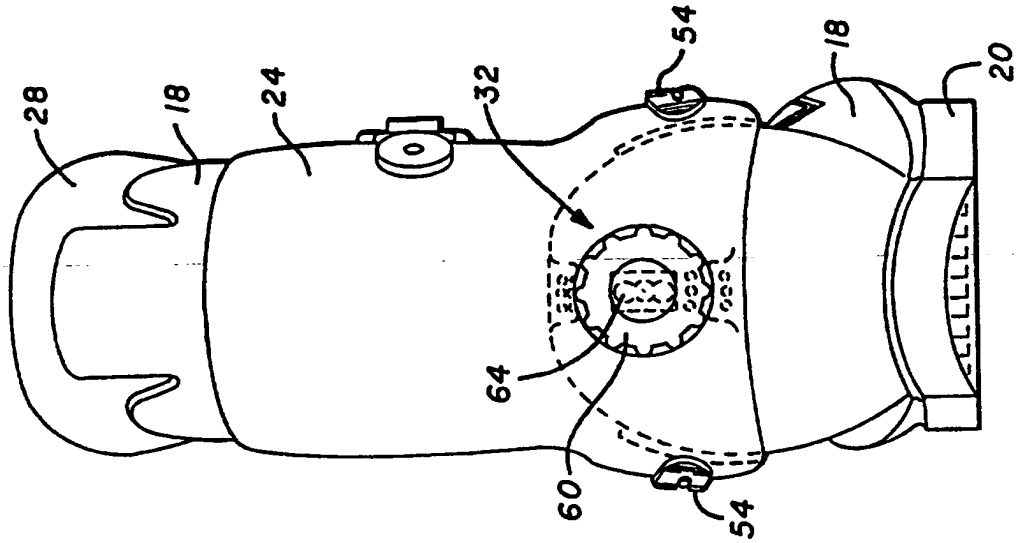


FIG. 3



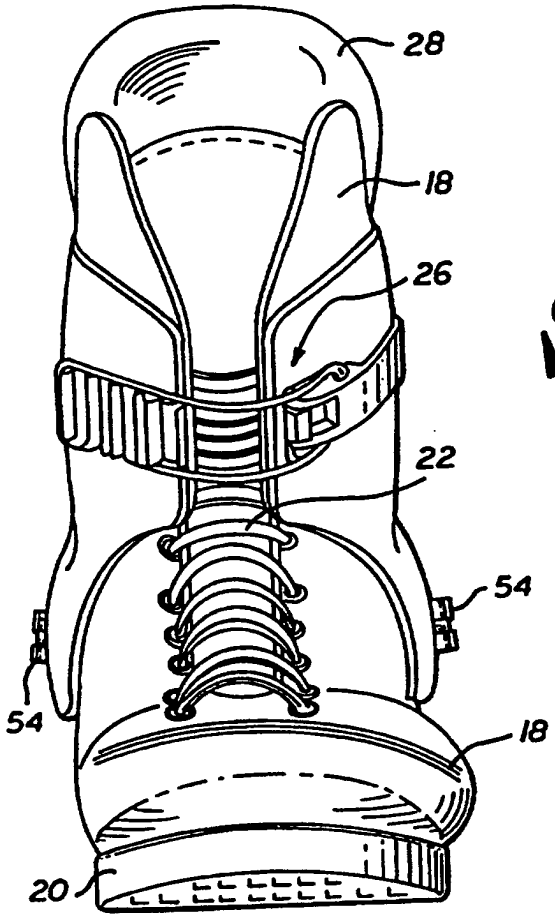


FIG. 4

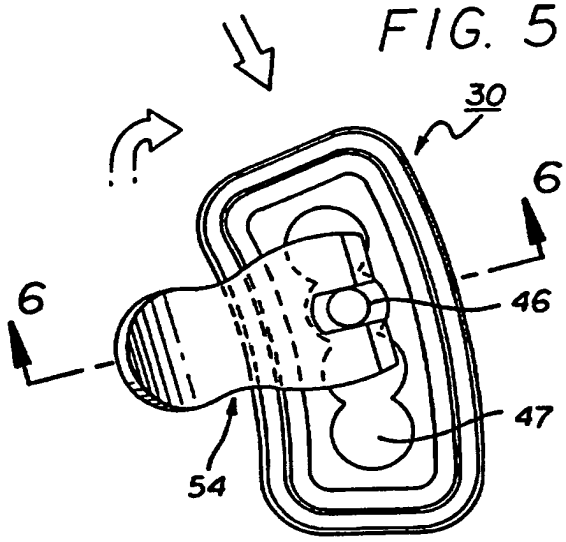


FIG. 5

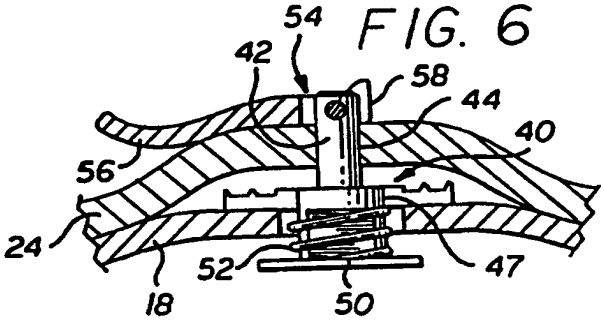


FIG. 6

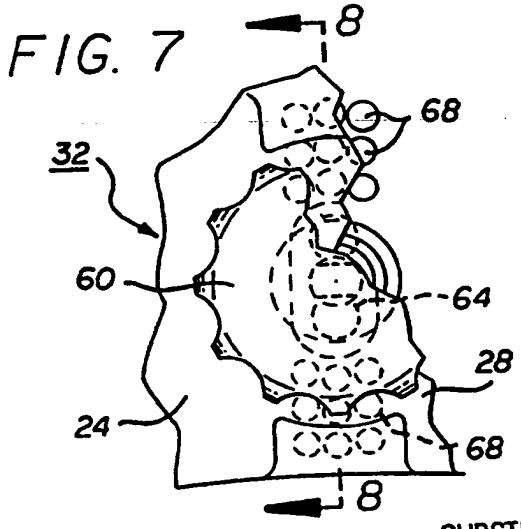


FIG. 7

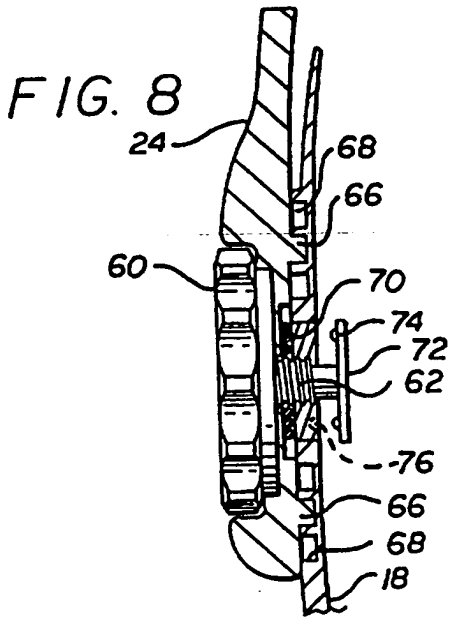
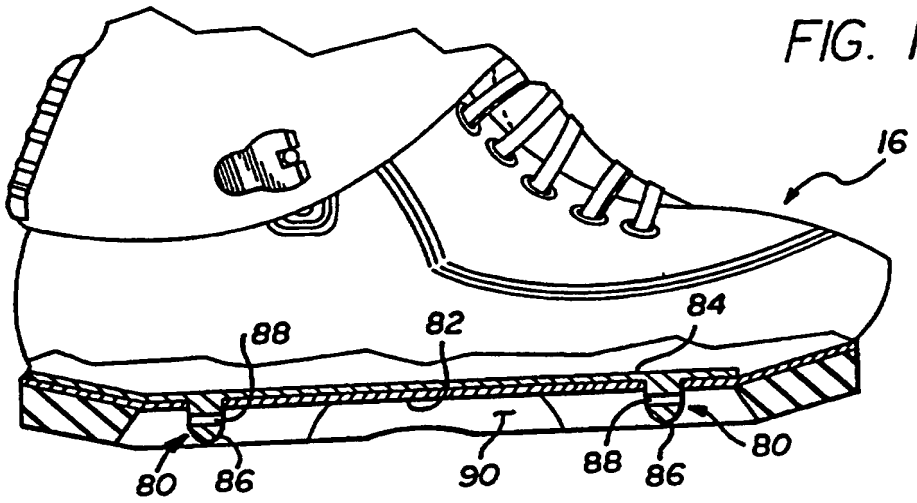


FIG. 8

FIG. 10



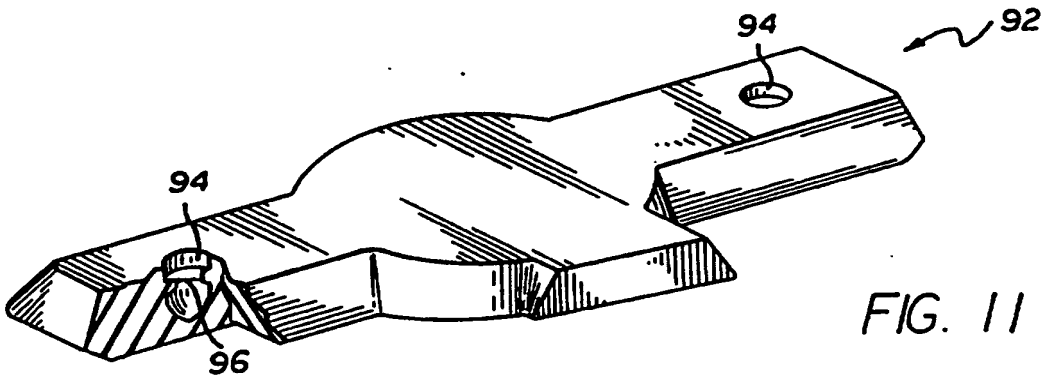


FIG. 11

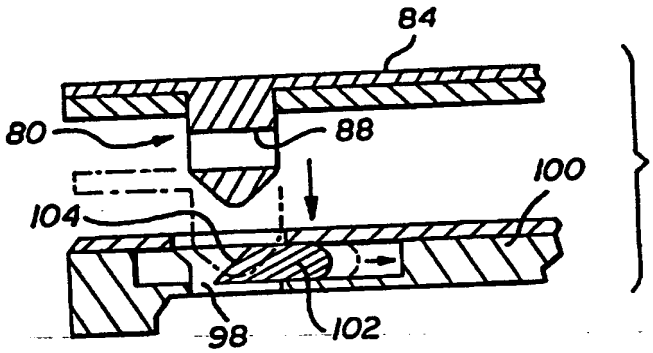


FIG. 12

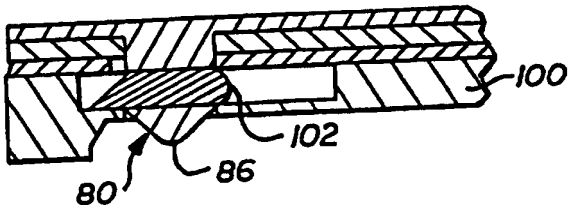


FIG. 13

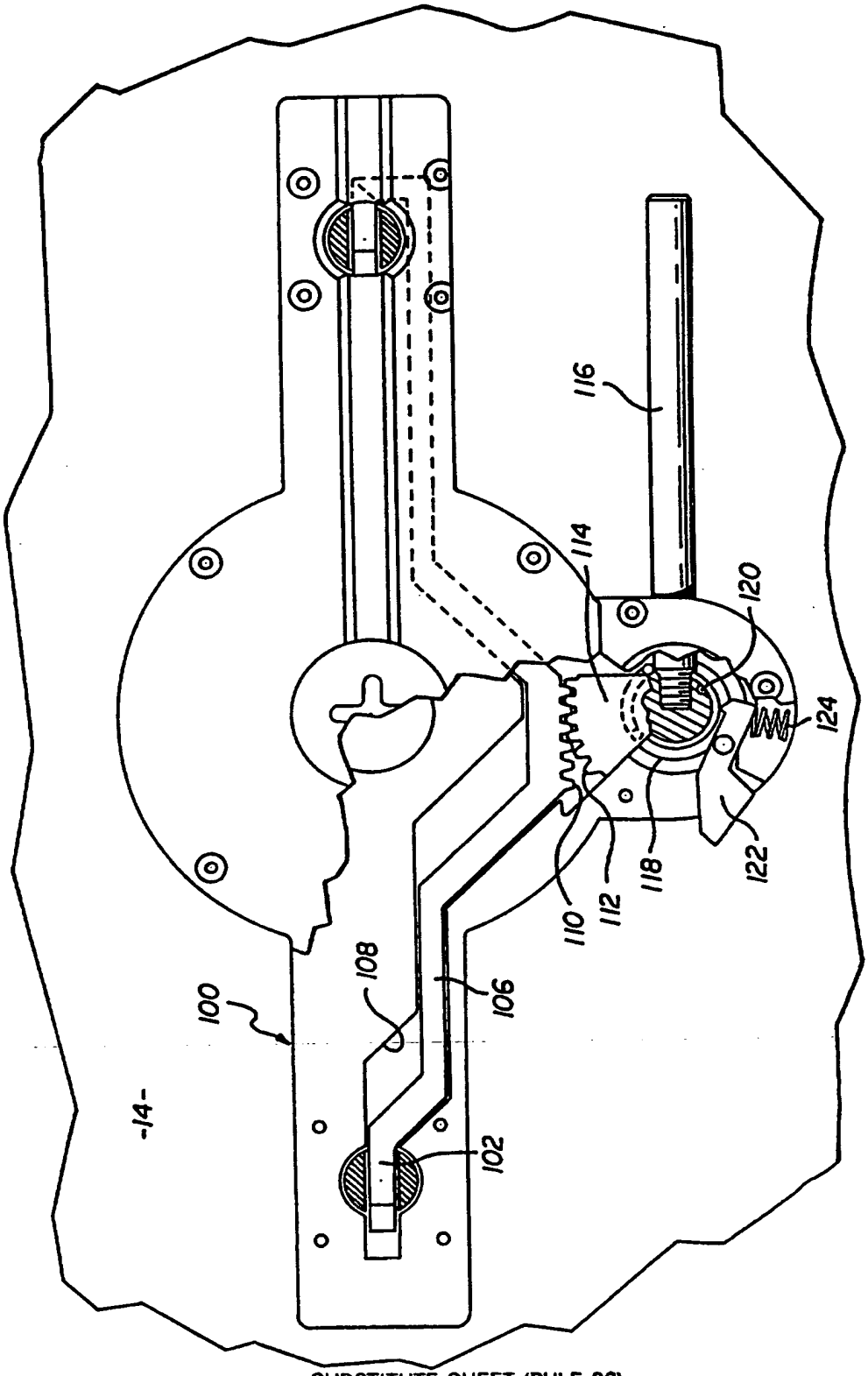


FIG. 14

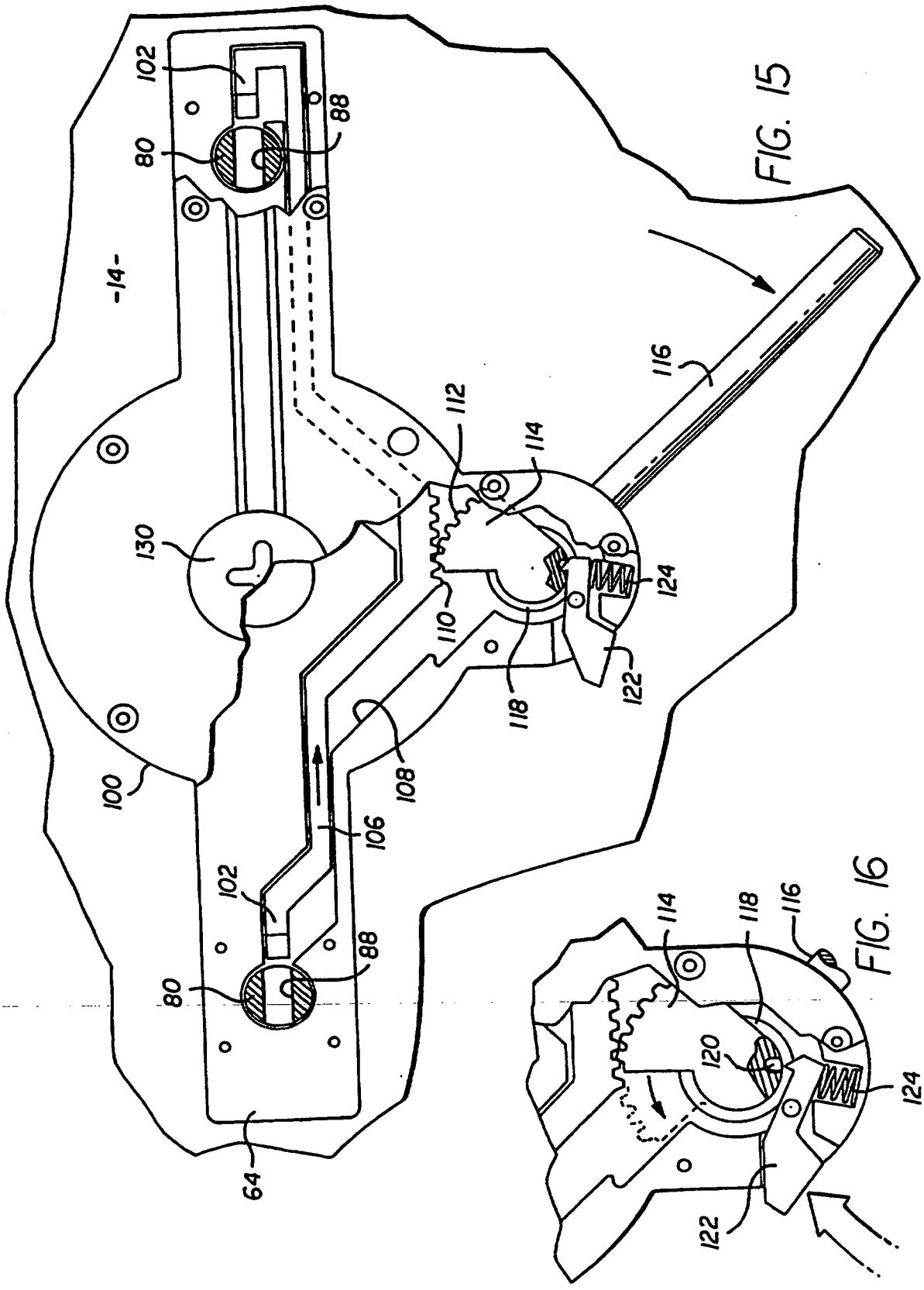

102
88
80
-14-
116
112
114
130
124
110
118
122
100
108
106
102
88
80
64

FIG. 15

114
118
116
120
124
122

FIG. 16

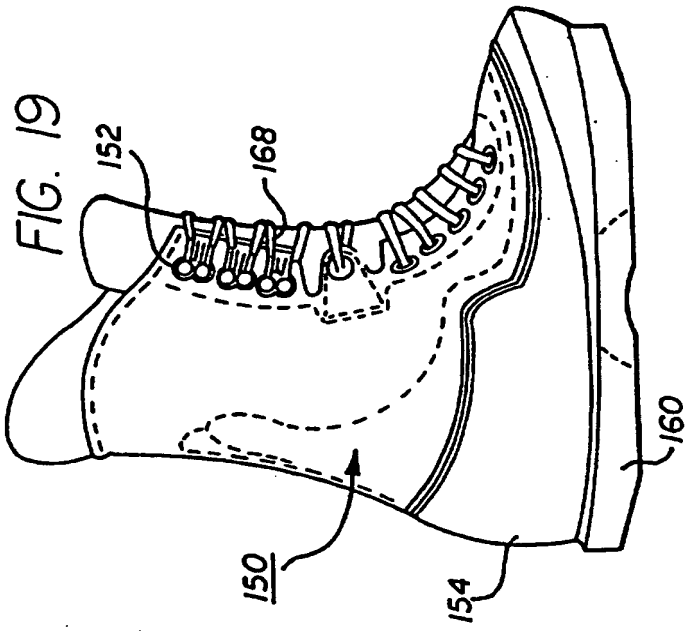


FIG. 19

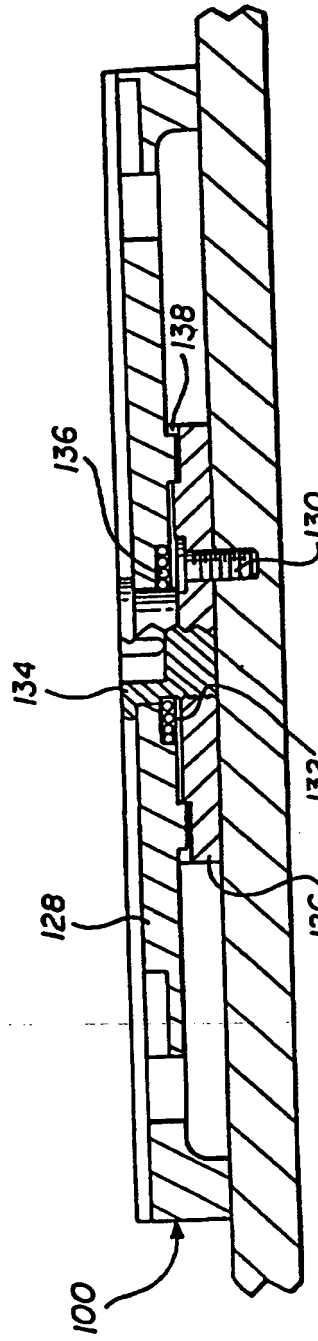


FIG. 17

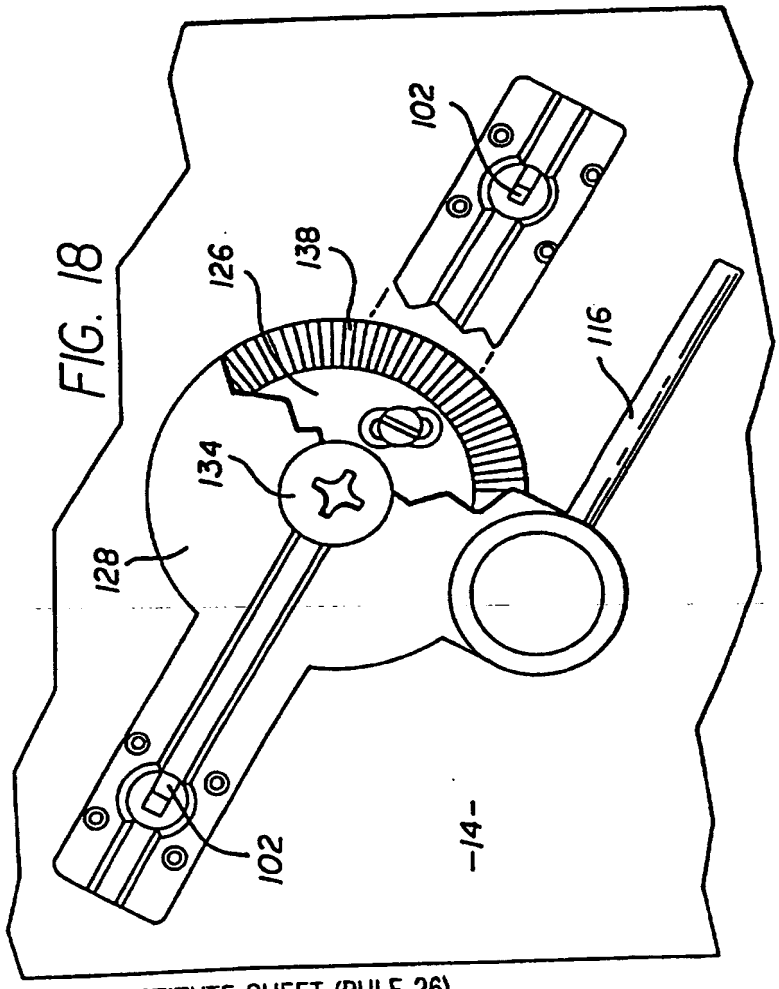


FIG. 18

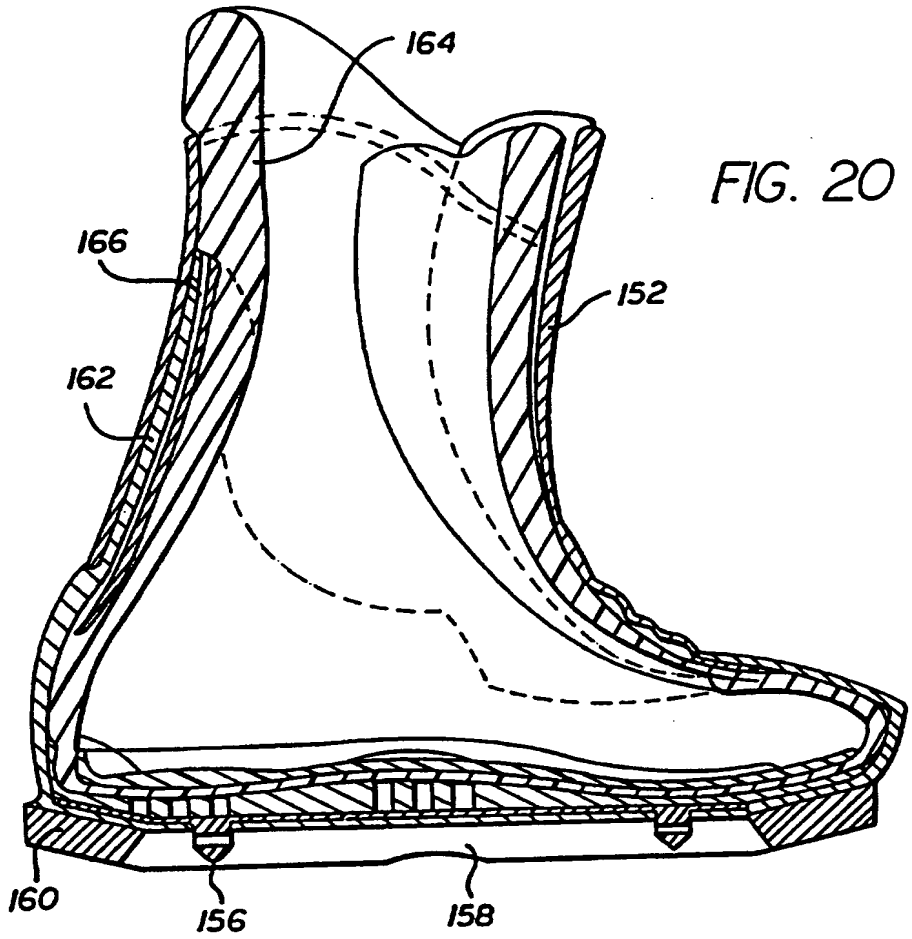


FIG. 20

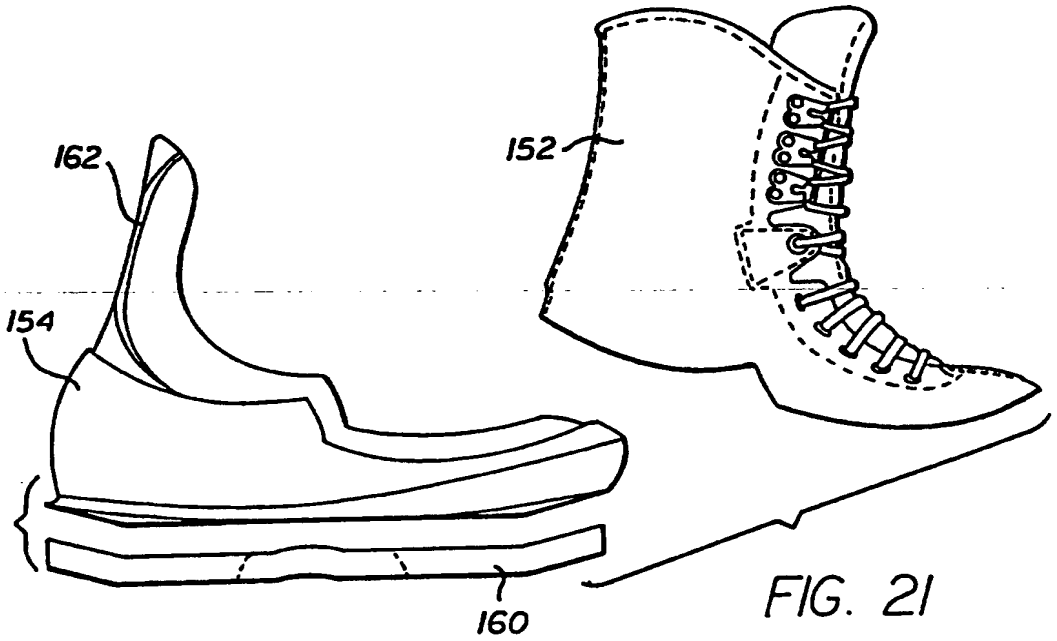


FIG. 21

FIG. 24

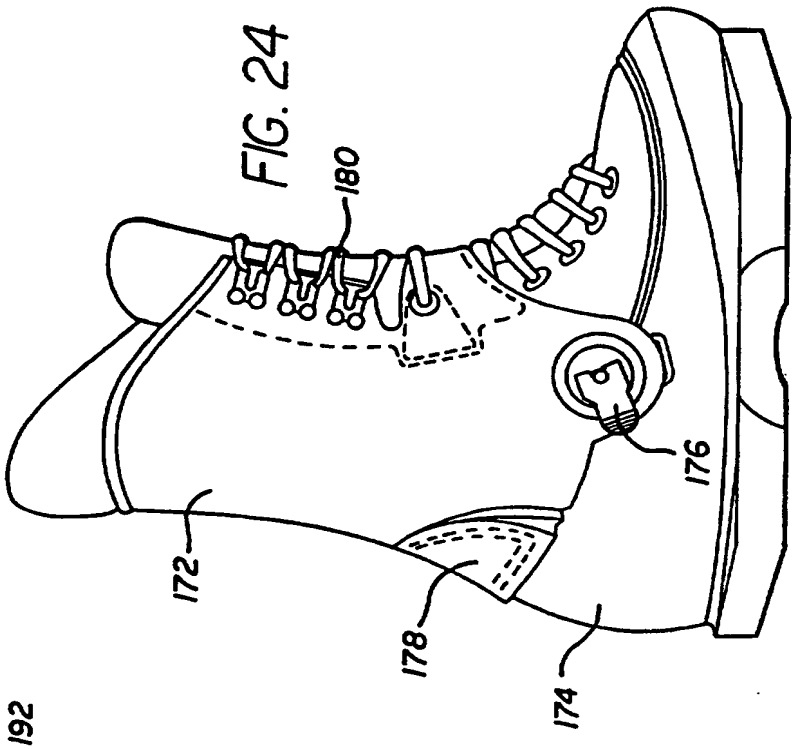


FIG. 23

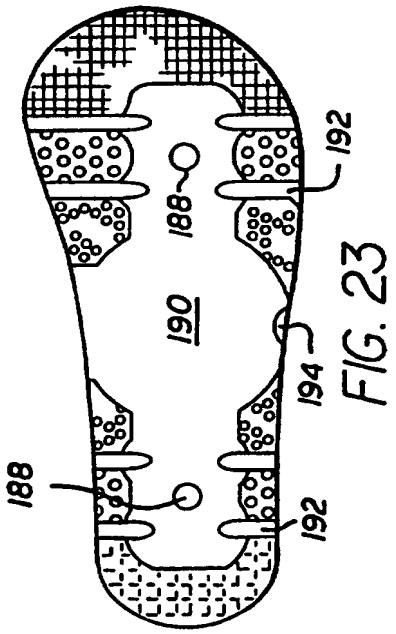
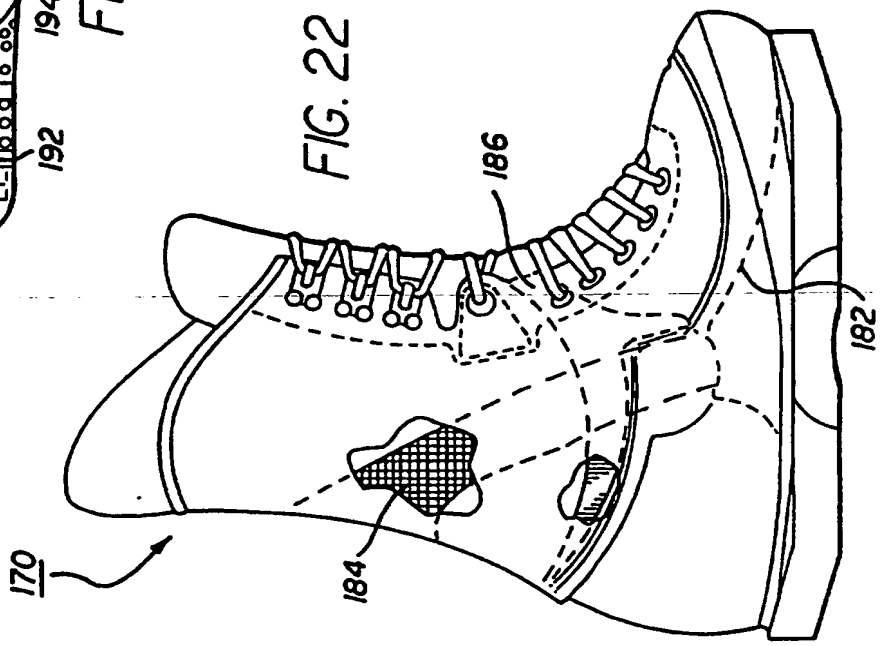


FIG. 22



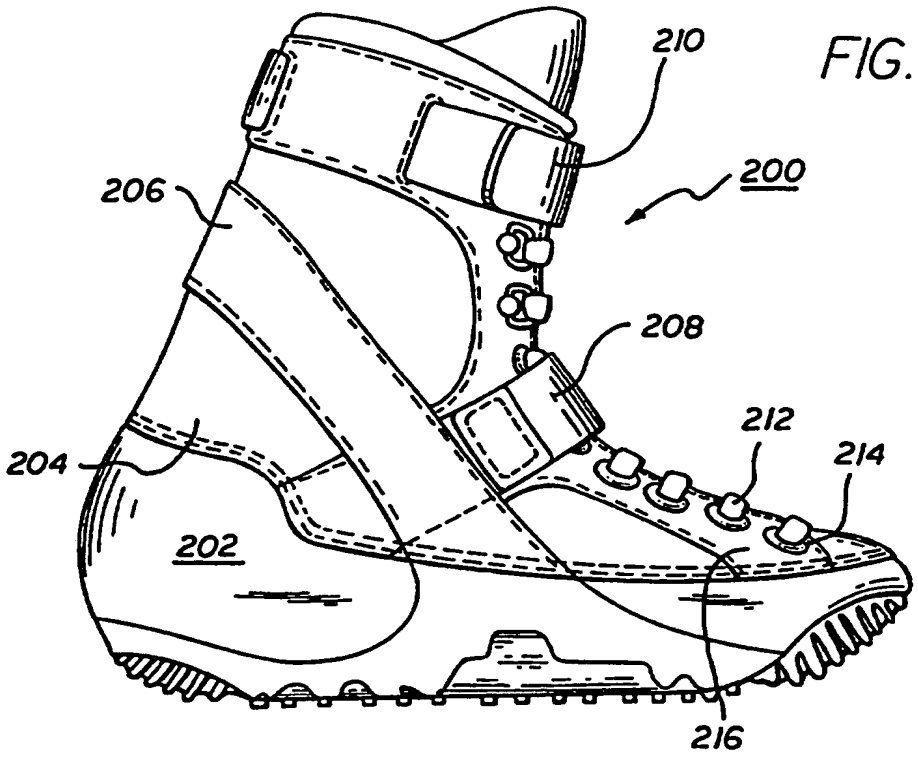


FIG. 25

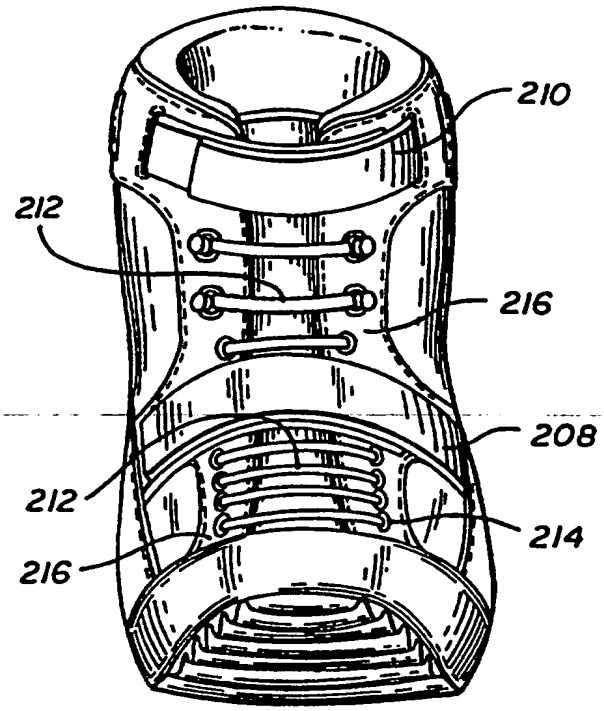


FIG. 26

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/09169

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A63C 9/086; A43B 5/04
US CL :280/613; 36/117
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 280/613, 614, 617, 14.2; 36/117, 118, 119, 120, 121

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 4,571,858 (Faulin) 25 February 1986, see entire document.	1-5
Y	US, A, 5,279,053 (Pallatin et al) 18 January 1994, see Figure 1 and 2.	1-5
A	US, A, 4,021,056 (Oakes) 3 May 1977.	
A	US, A, 4,191,395 (Salomon) 4 March 1980.	
A	US, A, 4,316,618 (Sampson) 23 February 1982.	
A	US, A, 5,044,654 (Meyer) 3 September 1991.	

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date		
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed	"&"	document member of the same patent family

Date of the actual completion of the international search 05 SEPTEMBER 1995	Date of mailing of the international search report 25 OCT 1995
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer H. Leon Mattix CARLA MATTIX Telephone No. (703) 308-1113

Form PCT/ISA/210 (second sheet)(July 1992)*